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Atty. Docket No. PPW06-580DS
Serial No: 10/748,652

OCT 31 2006

Amendments to the Claims

Please cancel claims 2 – 4 and 8 and amend claim 7. This listing of the Claims replaces all prior versions and listings of the Claims in this application.

Listing of the Claims

1. (Previously Presented) A method for forming a trench in a semiconductor device comprising:

forming a pad oxide film and a silicon nitride film on a silicon wafer;

forming a first photosensitive film pattern on the region to be formed with the trench by applying, exposing, and developing a photosensitive film on the silicon nitride film;

selectively etching the silicon nitride film and the pad oxide film on a region to be formed with a trench using the first photosensitive film pattern as a mask;

forming a second photosensitive film pattern having an opening portion of a width narrower than that of an opening portion of the first photosensitive film pattern on the silicon nitride film and the exposed silicon wafer, the opening portion of the second photosensitive film pattern having a center axis as the opening portion of the first photosensitive film pattern;

implanting oxygen ions into the silicon wafer in the region to be formed with the trench at a desired depth of the trench using the second photosensitive film pattern as a mask;

forming an oxide in the silicon wafer by reacting the oxygen ions with the silicon wafer through a thermal diffusion of the oxygen ions;

forming the trench by etching the silicon wafer and the oxide on the region to be formed with the trench using the silicon nitride film as a mask;

forming a liner oxide film on an inner wall of the trench using a thermal diffusion process; and

forming an insulation film on the liner oxide film such that the trench is filled,

Atty. Docket No. PPW06-580DS
Serial No: 10/748,652

wherein an edge at which a side and a bottom of the trench intersect has a curved surface.

2. (Cancelled)

3. (Cancelled)

4. (Cancelled)

5. (Previously Presented) The method of claim 1, wherein, during thermal diffusion of the oxygen ions, the oxygen ions are thermally diffused in a nitrogen atmosphere.

6. (Cancelled)

7. (Currently Amended) A method for forming a trench in a semiconductor device comprising:

forming a pad oxide film and a silicon nitride film on a ~~semiconductor-substrate~~
silicon wafer;

forming a first photosensitive film pattern on the region to be formed with the trench by applying, exposing, and developing a photosensitive film on the silicon nitride film;

selectively etching the silicon nitride film and the pad oxide film on a region to be formed with a trench using the first photosensitive film pattern as a mask;

forming a second photosensitive film pattern having an opening portion of a width narrower than that of an opening portion of the first photosensitive film pattern on the silicon nitride film and the exposed silicon wafer, the opening portion of the second photosensitive film pattern having a center axis as the opening portion of the first photosensitive film pattern;

implanting oxygen ions into the ~~semiconductor-substrate~~ silicon wafer in the region to be formed with the trench at a desired depth of the trench using the second photosensitive film pattern as a mask;

Atty. Docket No. PPW06-580DS
Serial No: 10/748,652

forming an oxide in the ~~semiconductor-substrate~~ silicon wafer by reacting the oxygen ions with the ~~semiconductor-substrate~~ silicon wafer through a thermal diffusion of the oxygen ions;

forming the trench by etching the ~~semiconductor-substrate~~ silicon wafer and the oxide on the region to be formed with the trench using the silicon nitride film as a mask;

forming a liner oxide film on an inner wall of the trench using a thermal diffusion process; and

forming an insulation film on the liner oxide film such that the trench is filled, wherein an oxide film is formed on an entire top surface including the silicon nitride film and the trench such that the trench is filled, and then the oxide film is chemically and mechanically polished until the silicon nitride film is exposed,

wherein an edge at which a side and a bottom of the trench intersect has a curved surface.

8. (Cancelled)

9. (Previously Presented) The method of claim 1, wherein said step of forming the trench comprises etching the silicon wafer and the oxide on the region to be formed with the trench at different rates.